

This listing of claims will replace all prior versions, and listings, of claims in the application:

1 Claim 1 (currently amended): An electronic camera
2 apparatus, comprising:

3 an A/D converting unit obtaining captured image
4 data by A/D converting an image signal that is obtained
5 by capturing an image;

6 a first image data processing unit executing a
7 preprocess for generating image data to be recorded from
8 the captured image data;

9 a second image data processing unit, which is
10 allowed to execute a process in parallel with the
11 preprocess executed by said first image data processing
12 unit, executing a preprocess that includes a filter
13 process and a pixel number conversion process in order to
14 generate image data to be displayed, whose data amount is
15 smaller than the image data to be recorded, from the
16 captured image data;

17 a storing unit temporarily storing, via a common
18 transmission path, both image data, which is obtained by
19 said first image data processing unit and for which the
20 preprocess for generating image data to be recorded is
21 executed, and image data, which is obtained by said
22 second image data processing unit and for which the
23 preprocess for generating image data to be displayed is
24 executed; and

25 a third image data processing unit executing an
26 image process for making recording and a display, which
27 are related to the captured image data, based on the

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28 image data to be recorded and the image data to be
29 displayed, which are stored in said storing unit.

1 Claim 2 (currently amended): The electronic camera
2 apparatus according to claim 1 5, wherein

3 The pixel number conversion process is configured
4 to perform interpolation by selecting a combination so
5 that pixel positions for which pixel number conversion is
6 performed become suitable according to a reduction in an
7 amount of image data.

1 Claim 3 (currently amended): The electronic camera
2 apparatus according to claim 1 5, wherein

3 the filter process and the pixel number conversion
4 process are configured as an LPF (Low Pass Filter)
5 process, and a pixel number conversion process including
6 an interpolation process considering a pixel position
7 relationship after pixel number conversion, for a
8 horizontal direction of the captured image data, and as
9 an LPF process and a pixel number conversion process,
10 which use a line buffer, the pixel number conversion
11 process including an interpolation process considering a
12 pixel position relationship after pixel number
13 conversion, for a vertical direction of the captured
14 image data.

1 Claim 4 (original): The electronic camera apparatus
2 according to claim 1, wherein

3 said second image data processing unit comprises

4 a horizontal direction filter unit executing a
5 filter process for a horizontal direction, which is an
6 input order of the captured image data, for the captured
7 image data,

8 a horizontal direction pixel number converting
9 unit executing an interpolation process for reducing an
10 amount of image data in the horizontal direction for
11 image data for which the filter process is executed by
12 said horizontal direction filter unit,

13 a vertical direction filter unit executing a
14 filter process for a vertical direction for image data
15 for which the interpolation process is executed by said
16 horizontal direction pixel number converting unit, and

17 a vertical direction pixel number converting unit
18 executing an interpolation process for reducing an amount
19 of image data in a vertical direction for image data for
20 which the filter process is executed by said vertical
21 direction filter unit.

1 Claim 5 (currently amended): The An electronic camera
2 apparatus ~~according to claim 1~~, comprising:

3 an A/D converting unit obtaining captured image
4 data by A/D converting an image signal that is obtained
5 by capturing an image;

6 a first image data processing unit executing a
7 preprocess for generating image data to be recorded from
8 the captured image data;

9 a second image data processing unit, which is
10 allowed to execute a process in parallel with the
11 preprocess executed by said first image data processing

12 unit, executing a preprocess that includes a filter
13 process and a pixel number conversion process in order to
14 generate image data to be displayed, whose data amount is
15 smaller than the image data to be recorded, from the
16 captured image data;

17 a storing unit temporarily storing both image data,
18 which is obtained by said first image data processing
19 unit and for which the preprocess for generating image
20 data to be recorded is executed, and image data, which is
21 obtained by said second image data processing unit and
22 for which the preprocess for generating image data to be
23 displayed is executed; and

24 a third image data processing unit executing an
25 image process for making recording and a display, which
26 are related to the captured image data, based on the
27 image data to be recorded and the image data to be
28 displayed, which are stored in said storing unit,

29 wherein said second image data processing unit
30 comprises

31 a horizontal direction filter unit executing a
32 filter process for a horizontal direction, which is an
33 input order of the captured image data, for the captured
34 image data,

35 a horizontal direction pixel number converting
36 unit executing an interpolation process for reducing an
37 amount of image data in the horizontal direction for
38 image data for which the filter process is executed by
39 said horizontal direction filter unit,

40 a multiplier multiplying the image data, for
41 which the interpolation process is executed by said

42 horizontal direction pixel number converting unit, by
43 factors for a filter process for a vertical direction,
44 and an interpolation process for reducing an amount of
45 image data in the vertical direction,

46 a line buffer temporarily storing the image
47 data obtained as a result of multiplication made by said
48 multiplier in units of lines, and

49 a vertical direction pixel number converting
50 unit executing the interpolation process for reducing the
51 amount of image data in the vertical direction based on
52 the image data stored in said line buffer and image data
53 in a next line, which is multiplied by said multiplier.

1 Claim 6 (original): The electronic camera apparatus
2 according to claim 5, wherein:

3 said line buffer comprises a line buffer different
4 for each line data in a same color filter arrangement;
5 and

6 said vertical direction pixel number converting unit
7 executes an interpolation process for reducing an amount
8 of image data in the vertical direction for each line
9 data in the same color filter arrangement.

1 Claim 7 (currently amended): ~~The An~~ electronic camera
2 apparatus ~~according to claim 3, comprising:~~

3 an A/D converting unit obtaining captured image
4 data by A/D converting an image signal that is obtained
5 by capturing an image;

6 a first image data processing unit executing a
7 preprocess for generating image data to be recorded from
8 the captured image data;

9 a second image data processing unit, which is
10 allowed to execute a process in parallel with the
11 preprocess executed by said first image data processing
12 unit, executing a preprocess that includes a filter
13 process and a pixel number conversion process in order to
14 generate image data to be displayed, whose data amount is
15 smaller than the image data to be recorded, from the
16 captured image data;

17 a storing unit temporarily storing both image data,
18 which is obtained by said first image data processing
19 unit and for which the preprocess for generating image
20 data to be recorded is executed, and image data, which is
21 obtained by said second image data processing unit and
22 for which the preprocess for generating image data to be
23 displayed is executed; and

24 a third image data processing unit executing an
25 image process for making recording and a display, which
26 are related to the captured image data, based on the
27 image data to be recorded and the image data to be
28 displayed, which are stored in said storing unit,

29 wherein the filter process and the pixel number
30 conversion process are configured as an LPF (Low Pass
31 Filter) process, and a pixel number conversion process
32 including an interpolation process considering a pixel
33 position relationship after pixel number conversion, for
34 a horizontal direction of the captured image data, and as
35 an LPF process and a pixel number conversion process,

36 which use a line buffer, the pixel number conversion
37 process including an interpolation process considering a
38 pixel position relationship after pixel number
39 conversion, for a vertical direction of the captured
40 image data, and

41 wherein, if the preprocess by said second image data
42 processing unit is executed for captured image data
43 obtained by capturing an image with a progressive
44 scanning method, an LPF process and a pixel number
45 conversion process that includes an interpolation process
46 considering a pixel position relationship after pixel
47 number conversion are executed by using at least two line
48 buffers for the vertical direction of the captured image
49 data.

1 Claim 8 (currently amended): The electronic camera
2 apparatus according to claim \pm 5, wherein
3 said third image data processing unit is configured to
4 execute an image data compression process as an image
5 process for recording.

1 Claim 9 (currently amended): The electronic camera
2 apparatus according to claim \pm 5, further comprising
3 a fourth image data processing unit, which is allowed to
4 execute a process in parallel with the preprocess
5 executed by said first image data processing unit,
6 generating index image data, whose data amount is smaller
7 than the image data to be displayed, from the captured
8 image data.

1 Claim 10 (currently amended): The electronic camera
2 apparatus according to claim \pm 5, wherein
3 said third image data processing unit is configured to
4 generate index image data whose data amount is smaller
5 than the image data to be displayed based on the image
6 data to be displayed, which is stored in said storing
7 unit.

1 Claim 11 (currently amended): The electronic camera
2 apparatus according to claim \pm 5, wherein
3 the image signal is obtained by capturing an image with a
4 progressive scanning method or an interlaced scanning
5 method.

Claims 12 and 13 (canceled)

1 Claim 14 (new): An image processing method for use in an
2 electronic camera apparatus, comprising:
3 obtaining captured image data by A/D converting an
4 image signal that is obtained by capturing an image;
5 executing a first preprocess for generating image
6 data to be recorded from the captured image data;
7 executing a second preprocess, which is allowed to
8 be executed in parallel with the first preprocess and
9 includes a filter process and a pixel number conversion
10 process in order to generate image data to be displayed,
11 whose data amount is smaller than the image data to be
12 recorded, from the captured image data;
13 temporarily storing, in a storing unit, both image
14 data for which the first preprocess for generating image

15 data to be recorded is executed, and image data for which
16 the second preprocess for generating image data to be
17 displayed is executed; and

18 executing an image process for making recording and
19 a display, which are related to the captured image data,
20 based on the image data to be recorded and the image data
21 to be displayed, which are stored in said storing unit,

22 wherein said second preprocess comprises:

23 executing a filter process for a horizontal
24 direction, which is an input order of the captured image
25 data, for the captured image data,

26 executing an interpolation process for reducing
27 an amount of image data in the horizontal direction for
28 image data for which the filter process is executed,

29 multiplying the image data, for which the
30 interpolation process is executed, by factors for a
31 filter process for a vertical direction, and an
32 interpolation process for reducing an amount of image
33 data in the vertical direction,

34 temporarily storing, in a line buffer, the
35 image data obtained as a result of multiplication in
36 units of lines, and

37 executing the interpolation process for
38 reducing the amount of image data in the vertical
39 direction based on the image data stored in said line
40 buffer and image data in a next line which is multiplied.

41

1 Claim 15 (new): An image processing method for use in an
2 electronic camera apparatus, comprising:

3 obtaining captured image data by A/D converting an
4 image signal that is obtained by capturing an image;

5 executing a first preprocess for generating image
6 data to be recorded from the captured image data;

7 executing a second preprocess, which is allowed to
8 be executed in parallel with the first preprocess and
9 includes a filter process and a pixel number conversion
10 process in order to generate image data to be displayed,
11 whose data amount is smaller than the image data to be
12 recorded, from the captured image data;

13 temporarily storing, in a storing unit, both image
14 data for which the first preprocess for generating image
15 data to be recorded is executed, and image data for which
16 the second preprocess for generating image data to be
17 displayed is executed; and

18 executing an image process for making recording and
19 a display, which are related to the captured image data,
20 based on the image data to be recorded and the image data
21 to be displayed, which are stored in said storing unit,

22 wherein the filter process and the pixel number
23 conversion process are configured as a low pass filter
24 process, and a pixel number conversion process including
25 an interpolation process considering a pixel position
26 relationship after pixel number conversion, for a
27 horizontal direction of the captured image data, and as a
28 low pass filter process and a pixel number conversion
29 process, which use a line buffer, the pixel number
30 conversion process including an interpolation process
31 considering a pixel position relationship after pixel

32 . number conversion, for a vertical direction of the
33 captured image data, and

34 wherein, if the second preprocess is executed for
35 captured image data obtained by capturing an image with a
36 progressive scanning method, a low pass filter process
37 and a pixel number conversion process that includes an
38 interpolation process considering a pixel position
39 relationship after pixel number conversion are executed
40 by using at least two line buffers for the vertical
41 direction of the captured image data.

1 Claim 16 (new): The electronic camera apparatus
2 according to claim 1, wherein the common transmission
3 path is a bus.

1 Claim 17 (new): The electronic camera apparatus
2 according to claim 1, wherein the storing unit is of a
3 single memory type.

1 Claim 18 (new): The electronic camera apparatus
2 according to claim 17, wherein the single memory type is
3 dynamic random access memory.